

JANUARY 2025

ADVISORY RADON AND SOIL GAS CONTROL LARGE AND COMPLEX BUILDINGS

BUILDING CODE SERVICES



RADON AND SOIL GAS CONTROL LARGE AND COMPLEX BUILDINGS

This advisory is intended to outline designer and builder responsibilities for radon and soil gas mitigation for large and complex buildings in compliance with the Ontario Building Code.

SCOPE AND APPLICATION

This advisory applies to construction for a building permit subject to the 2024 Ontario Building Code. This advisory replaces Advisory 20201130 issued November 2020.

Soil gas and radon mitigation measures apply to the construction of all new large and complex buildings and additions regulated under Part 3 of Division B of the Ontario Building Code used for major occupancies classified as,

- Group A assembly occupancies,
- Group B care, care and treatment or detention occupancies, or
- Group F Division 1, high hazard industrial occupancies

Exceeding 600 m² in building area or exceeding three storeys in building height and used for major occupancies classified as,

- Group C residential occupancies,
- Group D business and personal services occupancies,
- Group E mercantile occupancies,
- Group F Divisions 2 and 3, medium hazard industrial occupancies and low hazard industrial occupancies

There are no prescriptive requirements requiring radon and soil gas mitigation systems for buildings subject to renovation.

WHAT IS RADON

Radon is a colourless, odorless, radioactive gas that occurs naturally in the environment from the breakdown of uranium in soils and rocks. Radon is present at low levels outdoors but may become a problem when it accumulates inside a building.

Health Canada advises radon exists everywhere and presents low risk outdoors or in well ventilated areas but can accumulate in buildings causing elevated levels which may result in an increased risk of lung cancer.

BUILDING PERMIT REQUIREMENTS

Soil gas and radon mitigation design is required to be detailed and specified on building permit application submissions for all new construction.

For existing buildings, a building permit is not required to undertake radon mitigation where the work involved is non-structural, does not affect HVAC, plumbing, fire protection systems, fire separations or fire rated assemblies and the mitigation work does not interfere or pose a threat to the health and safety of the occupants.

DESIGN

Soil gas ingress and radon mitigation provisions for large and complex buildings are outlined in Division B of the 2024 Ontario Building Code in articles 5.4.1.1. and 6.2.1.1.

In addition to the installation of an air/soil gas barrier (5.4.1.1.), Ontario Building Code 6.2.1.1(1)(h) requires HVAC system design and installation to address potential radon and soil gas ingress in accordance with EPA 625/R-92/016 *Radon Prevention in the Design and Construction of Schools and Other Large Buildings*.

EPA 625/R-92/016 provides guidance on control systems for soil gas ingress including the allowance for multiple soil gas mitigation methods. This document specifically references Soil Depressurization, Building Pressurization and Sealing Radon Entry Routes as acceptable radon prevention techniques.

The EPA 625/R-92/016 standard may be found at the following link,
[Document Display | NEPIS | US EPA](#)

RADON MITIGATION INSTALLATION EXCEPTIONS

The installation of an air barrier and radon mitigation measures are outlined in Ontario Building Code Division B 5.4.1.1. Exceptions to the installation of an air barrier are noted in 5.4.1.1.(7) and appendix note A-5.4.1.1.(7) describing locations where an air barrier is not required.

Exceptions to installation of an air barrier, soil gas barrier and radon mitigation measures require the designer to provide justification for the exception.

AIR AND SOIL GAS BARRIERS

A soil gas barrier consists of the installation of a membrane installed between a conditioned space from the ground or construction in contact with ground or soil. In accordance with Ontario Building Code 5.4.1.1.(1)(e), the air barrier is required to minimize the ingress of airborne radon and other soil gases from the ground to control the indoor concentrations to a level below the Health Canada threshold of 200 becquerels per cubic metre.

Where polyethylene sheet is used as a soil gas barrier for floors on grade, it shall conform to CAN/CGSB-51.34-M86 - Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

AIR BARRIER ALTERNATIVES

Use of other soil gas barrier materials may be considered provided they have been evaluated for use as an acceptable air barrier.

Ontario Building Code 5.4.1.2.(2) outlines measures for evaluating air barriers that have not been tested in accordance with CAN/ULC S742 Standard for Air Barrier Assemblies – Specification. Ontario Building Code appendix.

Air barrier materials are required to comply with CAN/ULC S742 Standard for Air Barrier Assemblies – Specification.

The standard scope outlines the requirements and test methods for an air barrier assembly used in applications for both low-rise and high-rise buildings. The test methods described in this standard involve measuring the air leakage rate of a representative test specimen of an air barrier assembly.

Ontario Building Code Appendix note A-5.4.1.2.(2) AND A-5.4.1.2.(4) describe field testing of air barriers (and below grade air barriers) that must be conducted in accordance with ASTM E783 – Standard Test for Field Measurement of Air Leakage Through Insulated Exterior Windows and Doors AND E1186 – Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems. The appendix notes advise that the methodology applied to windows and doors may be acceptable for assessing other types of air barrier assemblies.

The designer is responsible for specifying the air/soil gas barrier including continuity, intersections with other materials and details for sealing junctions and penetrations.

LABELLING

All large and complex buildings require for labeling of radon/soil gas piping systems in accordance with EPA 625/R92/016, “Radon Prevention in the Design and Construction of Schools and Other Large Buildings.”

EPA 625/R92/016 states the following - 2.1.1.4 Radon Vent Pipe states exposed radon vent pipes shall be labelled to identify as a component of a radon vent system that may contain hazardous levels of radon. Labels shall be placed at intervals not exceeding 3 m.

C-NARP - Canadian National Radon Proficiency Program

FOR ADDITIONAL INFORMATION: Use the following link to obtain pipe labels free of charge.

www.c-nrpp.ca

TESTING

The Ontario Building Code does not require mandatory testing for radon.

Health Canada recommends use of a long-term radon detector with a test duration for a minimum of three months. Health Canada has produced a series of publications with respect to radon, impact on health and radon mitigation, including design and installation provisions considered a best practice approach. Radon levels may change seasonally or over the life of a

building and cannot be predicted in advance of the completion of a building and testing. For more information refer to Health Canada's publication [Guide for Radon Measurements in Public Buildings - Canada.ca](#)

ROLES AND RESPONSIBILITIES FOR DESIGNERS AND BUILDERS

Designers and builders are required to design and install an air/soil gas barrier and to incorporate radon mitigation measures in HVAC systems in accordance with EPA 625/R-92/016 Radon Prevention in the Design and Construction of Schools and Other Large Buildings and Health Canada's guideline [Guide for Radon Measurements in Public Buildings - Canada.ca](#)

Design and site review of soil gas mitigation and accompanying HVAC systems is required to be undertaken by a professional (architect or professional engineer)